

## Welcome to the first edition of the newly redesigned Brookhaven National Laboratory LabLink!

Brookhaven Lab's broad mission is to produce excellent science. Our scientists conduct research in the physical, biomedical, and environmental sciences, and in energy technology and national security. One of 10 national laboratories overseen and funded by the U.S. Department of Energy's Office of Science, BNL is among the five largest high-technology employers on Long Island.

The Community Relations Office is publishing this monthly e-newsletter to serve as a "link" between BNL and the community. We'll let you know what is going on at the Lab, help you understand some of the science behind our world-class research, and invite you to our many educational and cultural events.



### BNL Research Addresses Energy Challenges

Our nation faces a grand challenge in finding alternatives to fossil fuels and improving energy efficiency to meet our exponentially growing energy needs over the next century and beyond. Energy research at the Laboratory is leading to advances that can transcend the limitations of current technologies and may enable completely new and vastly more efficient energy systems. Outlined below are several areas of research where we are taking advantage of Brookhaven Lab's unique facilities and technical strengths to address scientific challenges in energy. Watch for more on our energy research in upcoming issues.



Hydrogen storage research

### Batteries and Energy Storage: Key to Integrating renewable energy into the grid

Increasing our reliance on renewable energy sources like solar and wind power will require finding new ways to store that energy for times when the sun isn't shining and the wind isn't blowing. Applying discoveries made possible with the new tools of nanoscience, Brookhaven researchers are exploring more effective technologies for energy storage. Examples

include improved batteries, developed in partnership with other New York State research institutions; basic electrochemical research to significantly improve the efficiency and reliability of fuel cells; and a superconducting magnetic energy storage system with near-zero energy loss, instantaneous response, and nearly infinite cycle life.

### Happenings

- **August 24** – Noon recital, Vocalist and Broadway star Melissa Errico to perform. Berkner Hall auditorium, free.
- **September 8** – BSA Distinguished Lecture, "Creating Personalized Solar Energy for Six Billion People," Daniel Nocera, MIT. Berkner Hall auditorium, 4:00 p.m., free.
- **September 8** – Next meeting of the Lab's Community Advisory Council, 6:30 p.m. Berkner Hall, Room B.

\*Visitors 16 and over must bring a photo ID for access to BNL events

## **Solar Energy:** Harnessing the Sun's power for fuel and electricity

Globally, we currently use energy at a rate of about 13 terawatts (13 trillion watts) worldwide – and by 2050, that amount is expected to double. Fossil fuels and other non-renewable sources are not the answer to the world's ever-expanding

need for energy. If solar cell manufacturing costs could be reduced, these devices could provide cost-competitive electricity and be deployed on a more widespread basis. Brookhaven scientists are working on converting solar energy to liquid fuels,

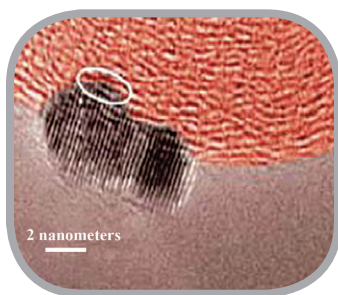
improving the efficiency of solar cells using inexpensive materials, and developing new manufacturing processes that reduce and recycle the materials used in second generation, thin-film photovoltaics.

## **Fuel-cell Vehicles:** More Practical Thanks to BNL Research

A pricey addition to your jewelry collection, platinum is also one of the most efficient metals used to drive reactions in automotive fuel cells in electric cars. But the precious platinum quickly degrades in stop-and-go driving. Brookhaven Lab scientists have developed a new electrocatalyst that minimizes platinum's wear and tear while maintaining high levels of reactivity. The new catalysts contain a palladium nanoparticle core that protects the single-atom layer of platinum surrounding the particles. The research may greatly enhance the practicality of fuel-cell vehicles. The research may also be applied to improve the performance of other metallic catalysts.



Long Island Solar Farm ground-based array



Nanostructured gold/platinum/copper electro-catalyst

## **Catalysis:** Driving toward alternative fuels

About 85 percent of the nation's energy needs are met by the combustion of fossil fuels such as oil, natural gas, and coal – finite resources that make the United States dependent upon other countries while polluting the environment through carbon emissions.

The next-generation catalytic challenges require complex steps to turn alternative energy sources into electrical energy that is then transformed into chemical fuels, or by directly converting carbon dioxide and water into useable fuel sources with the assistance of power from the sun.

To meet these challenges, researchers at BNL are developing an atomic-level understanding of these chemical transformations and the catalysts that enable them.

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